

|    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|    | Arg | Asp | Ala | Arg | Val | Ile | Val | Leu | Thr | Gly | Ala | Ala | Ser | Thr | Gly | Val |  |
|    | 530 |     |     |     |     |     | 535 |     |     |     |     |     | 540 |     |     |     |  |
| 5  | Gly | Gly | Gln | Val | Ser | Val | Asn | Met | Pro | Leu | Gln | Lys | Thr | Met | Glu | Ile |  |
|    | 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |  |
|    | Gly | Glu | Asn | Leu | Thr | Ser | Arg | Thr | Phe | Arg | Tyr | Thr | Asp | Phe | Ser | Asn |  |
|    |     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |  |
| 10 | Pro | Phe | Ser | Phe | Arg | Ala | Asn | Pro | Asp | Ile | Ile | Gly | Ile | Ser | Glu | Gln |  |
|    |     |     |     | 580 |     |     |     |     | 585 |     |     |     |     | 590 |     |     |  |
|    | Pro | Leu | Phe | Gly | Ala | Gly | Ser | Ile | Ser | Ser | Gly | Glu | Leu | Tyr | Ile | Asp |  |
| 15 |     |     | 595 |     |     |     | 600 |     |     |     |     |     | 605 |     |     |     |  |
|    | Lys | Ile | Glu | Ile | Ile | Leu | Ala | Asp | Ala | Thr | Phe | Glu | Ala | Glu | Ser | Asp |  |
|    | 610 |     |     |     |     | 615 |     |     |     |     |     | 620 |     |     |     |     |  |
| 20 | Leu | Glu | Arg | Ala | Gln | Lys | Ala | Val | Asn | Ala | Leu | Phe | Thr | Ser | Ser | Asn |  |
|    | 625 |     |     |     |     | 630 |     |     |     |     | 635 |     |     |     |     | 640 |  |
|    | Gln | Ile | Gly | Leu | Lys | Thr | Asp | Val | Thr | Asp | Tyr | His | Ile | Asp | Gln | Val |  |
|    |     |     |     | 645 |     |     |     |     | 650 |     |     |     |     |     | 655 |     |  |
| 25 | Ser | Asn | Leu | Val | Asp | Cys | Leu | Ser | Asp | Glu | Phe | Cys | Leu | Asp | Glu | Lys |  |
|    |     |     | 660 |     |     |     |     |     | 665 |     |     |     |     | 670 |     |     |  |
|    | Arg | Glu | Leu | Ser | Glu | Lys | Val | Lys | His | Ala | Lys | Arg | Leu | Ser | Asp | Glu |  |
| 30 |     |     | 675 |     |     |     |     | 680 |     |     |     |     |     | 685 |     |     |  |
|    | Arg | Asn | Leu | Leu | Gln | Asp | Pro | Asn | Phe | Arg | Gly | Ile | Asn | Arg | Gln | Pro |  |
|    | 690 |     |     |     |     | 695 |     |     |     |     |     | 700 |     |     |     |     |  |
| 35 | Asp | Arg | Gly | Trp | Arg | Gly | Ser | Thr | Asp | Ile | Thr | Ile | Gln | Gly | Gly | Asp |  |
|    | 705 |     |     |     |     | 710 |     |     |     |     | 715 |     |     |     |     | 720 |  |
|    | Asp | Val | Phe | Lys | Glu | Asn | Tyr | Val | Thr | Leu | Pro | Gly | Thr | Val | Asp | Glu |  |
|    |     |     |     | 725 |     |     |     |     |     | 730 |     |     |     |     | 735 |     |  |
| 40 | Cys | Tyr | Pro | Thr | Tyr | Leu | Tyr | Gln | Lys | Ile | Asp | Glu | Ser | Lys | Leu | Lys |  |
|    |     |     |     | 740 |     |     |     |     | 745 |     |     |     |     | 750 |     |     |  |
|    | Ala | Tyr | Thr | Arg | Tyr | Glu | Leu | Arg | Gly | Tyr | Ile | Glu | Asp | Ser | Gln | Asp |  |
| 45 |     |     | 755 |     |     |     |     | 760 |     |     |     |     | 765 |     |     |     |  |
|    | Leu | Glu | Ile | Tyr | Leu | Ile | Arg | Tyr | Asn | Ala | Lys | His | Glu | Ile | Val | Asn |  |
|    | 770 |     |     |     |     | 775 |     |     |     |     |     | 780 |     |     |     |     |  |
| 50 | Val | Pro | Gly | Thr | Gly | Ser | Leu | Trp | Pro | Leu | Ser | Ala | Gln | Ser | Pro | Ile |  |
|    | 785 |     |     |     |     | 790 |     |     |     |     | 795 |     |     |     |     | 800 |  |
|    | Gly | Lys | Cys | Gly | Glu | Pro | Asn | Arg | Cys | Ala | Pro | His | Leu | Glu | Trp | Asn |  |
|    |     |     |     | 805 |     |     |     |     |     | 810 |     |     |     |     | 815 |     |  |

|    |      |      |     |      |     |      |      |      |      |      |      |      |      |     |      |     |  |
|----|------|------|-----|------|-----|------|------|------|------|------|------|------|------|-----|------|-----|--|
|    | Pro  | Asp  | Leu | Asp  | Cys | Ser  | Cys  | Arg  | Asp  | Gly  | Glu  | Lys  | Cys  | Ala | His  | His |  |
|    |      |      |     | 820  |     |      |      |      | 825  |      |      |      |      | 830 |      |     |  |
| 5  | Ser  | His  | His | Phe  | Thr | Leu  | Asp  | Ile  | Asp  | Val  | Gly  | Cys  | Thr  | Asp | Leu  | Asn |  |
|    |      | 835  |     |      |     |      |      | 840  |      |      |      |      | 845  |     |      |     |  |
|    | Glu  | Asp  | Leu | Gly  | Val | Trp  | Val  | Ile  | Phe  | Lys  | Ile  | Lys  | Thr  | Gln | Asp  | Gly |  |
|    |      | 850  |     |      |     |      | 855  |      |      |      |      | 860  |      |     |      |     |  |
| 10 | His  | Ala  | Arg | Leu  | Gly | Asn  | Leu  | Glu  | Phe  | Leu  | Glu  | Glu  | Lys  | Pro | Leu  | Leu |  |
|    | 865  |      |     |      |     | 870  |      |      |      |      | 875  |      |      |     | 880  |     |  |
|    | Gly  | Glu  | Ala | Leu  | Ala | Arg  | Val  | Lys  | Arg  | Ala  | Glu  | Lys  | Lys  | Trp | Arg  | Asp |  |
| 15 |      |      |     | 885  |     |      |      |      |      | 890  |      |      |      |     | 895  |     |  |
|    | Lys  | Arg  | Glu | Lys  | Leu | Gln  | Leu  | Glu  | Thr  | Asn  | Ile  | Val  | Tyr  | Lys | Glu  | Ala |  |
|    |      |      | 900 |      |     |      |      |      | 905  |      |      |      |      | 910 |      |     |  |
| 20 | Lys  | Glu  | Ser | Val  | Asp | Ala  | Leu  | Phe  | Val  | Asn  | Ser  | Gln  | Tyr  | Asp | Arg  | Leu |  |
|    |      | 915  |     |      |     |      |      | 920  |      |      |      |      | 925  |     |      |     |  |
|    | Gln  | Val  | Asp | Thr  | Asn | Ile  | Ala  | Met  | Ile  | His  | Ala  | Ala  | Asp  | Lys | Arg  | Val |  |
|    |      | 930  |     |      |     |      | 935  |      |      |      |      | 940  |      |     |      |     |  |
| 25 | His  | Arg  | Ile | Arg  | Glu | Ala  | Tyr  | Leu  | Pro  | Glu  | Leu  | Ser  | Val  | Ile | Pro  | Gly |  |
|    | 945  |      |     |      |     | 950  |      |      |      |      | 955  |      |      |     | 960  |     |  |
|    | Val  | Asn  | Ala | Ala  | Ile | Phe  | Glu  | Glu  | Leu  | Glu  | Gly  | Arg  | Ile  | Phe | Thr  | Ala |  |
| 30 |      |      |     |      | 965 |      |      |      |      | 970  |      |      |      |     | 975  |     |  |
|    | Tyr  | Ser  | Leu | Tyr  | Asp | Ala  | Arg  | Asn  | Val  | Ile  | Lys  | Asn  | Gly  | Asp | Phe  | Asn |  |
|    |      |      | 980 |      |     |      |      |      | 985  |      |      |      |      | 990 |      |     |  |
| 35 | Asn  | Gly  | Leu | Leu  | Cys | Trp  | Asn  | Val  | Lys  | Gly  | His  | Val  | Asp  | Val | Glu  | Glu |  |
|    |      | 995  |     |      |     |      |      | 1000 |      |      |      |      | 1005 |     |      |     |  |
|    | Gln  | Asn  | Asn | His  | Arg | Ser  | Val  | Leu  | Val  | Ile  | Pro  | Glu  | Trp  | Glu | Ala  | Glu |  |
|    |      | 1010 |     |      |     |      | 1015 |      |      |      |      | 1020 |      |     |      |     |  |
| 40 | Val  | Ser  | Gln | Glu  | Val | Arg  | Val  | Cys  | Pro  | Gly  | Arg  | Gly  | Tyr  | Ile | Leu  | Arg |  |
|    | 1025 |      |     |      |     | 1030 |      |      |      |      | 1035 |      |      |     | 1040 |     |  |
|    | Val  | Thr  | Ala | Tyr  | Lys | Glu  | Gly  | Tyr  | Gly  | Glu  | Gly  | Cys  | Val  | Thr | Ile  | His |  |
| 45 |      |      |     | 1045 |     |      |      |      |      | 1050 |      |      |      |     | 1055 |     |  |
|    | Glu  | Ile  | Glu | Asp  | Asn | Thr  | Asp  | Glu  | Leu  | Lys  | Phe  | Ser  | Asn  | Cys | Val  | Glu |  |
|    |      | 1060 |     |      |     |      |      |      | 1065 |      |      |      | 1070 |     |      |     |  |
| 50 | Glu  | Glu  | Val | Tyr  | Pro | Asn  | Asn  | Thr  | Val  | Thr  | Cys  | Asn  | Asn  | Tyr | Thr  | Gly |  |
|    |      | 1075 |     |      |     |      |      | 1080 |      |      |      |      | 1085 |     |      |     |  |
|    | Thr  | Gln  | Glu | Glu  | Tyr | Glu  | Gly  | Thr  | Tyr  | Thr  | Ser  | Arg  | Asn  | Gln | Gly  | Tyr |  |
|    |      | 1090 |     |      |     |      | 1095 |      |      |      |      | 1100 |      |     |      |     |  |

Asp Glu Ala Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser  
1105 1110 1115 1120

5 Val Tyr Glu Glu Lys Ser Tyr Thr Asp Gly Arg Arg Glu Asn Pro Cys  
1125 1130 1135

Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly Tyr  
1140 1145 1150

10 Val Thr Lys Asp Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp Ile  
1155 1160 1165

15 Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser Val Glu Leu  
1170 1175 1180

Leu Leu Met Glu Glu  
1185

20 (2) INFORMATION FOR SEQ ID NO:13:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 49 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

25 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

30 GCATTAAAG AATGGGAAGA AGATAATAAT CCAGCAACCA GGACCAGAG

49

35 (2) INFORMATION FOR SEQ ID NO:14:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 55 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

40 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

45 GCATTAAAG AATGGGAAGA AGATCCTAAT GCAAATCCAG CAACCAGGAC CAGAG

55

(2) INFORMATION FOR SEQ ID NO:15:

- 50 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 17 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear